Evaluation of Glasgow (IMRIE) Score, CRP and Balthazar Score in Predicting Severity of Acute Pancreatitis

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Abstract: _Background: Acute pancreatitis (AP) is an acute inflammatory disease and is one of the most frequent gastrointestinal causes of hospital admission. This study was carried out to compare the efficacy of Glasgow (Imrie) score, C-Reactive Protein and Balthazar score in predicting severity of Acute Pancreatitis based on Revised Atlanta classification (RAC). Aim and objectives: The aim of this study is to compare Glasgow (Imrie) score, C-Reactive Protein and Balthazar score in predicting severity of Acute Pancreatitis based on Revised Atlanta classification (RAC). Methods: This was a prospective observational cohort study carried out at Sir Sayajirao General Hospital from February 2022 to November 2022 and achieved Sample Size-57 patients. Results and Conclusion: In conclusion we found that GLASGOW score, CRP & BALTHAZAR score have comparable sensitivity and specificity in predicting severity and mortality of acute pancreatitis._

Keywords: GLASGOW score, CRP, BALTHAZAR score, observed morbidity, observed mortality

1. Introduction

Acute pancreatitis (AP) is an acute inflammatory disease and is one of the most frequent gastrointestinal causes of hospital admission. The early assessment of disease severity to estimate the complications and even organ failure is fundamental: approximately 23% of the deaths attributable to AP occur in the first 3 days, and 53% within the first week [1]. Early identification of patients at increased risk of severe and fatal AP is crucial to improve prognosis. [1] Several prognostic scoring systems have been used to predict severity and mortality in AP, including Ranson score, Glasgow score, Balthazar score and the acute physiology and chronic health evaluation (APACHE II). [2]. In addition to clinical scoring systems, numerous individual biomarkers have been proposed as having a predictive value in acute pancreatitis: C-reactive protein (CRP), blood urea nitrogen, haematocrit and interleukins 6 and 8. [3] This study was carried out to compare the efficacy of Glasgow (Imrie) score, C-Reactive Protein and Balthazar score in predicting severity of Acute Pancreatitis based on Revised Atlanta classification (RAC).

2. Materials and Methods

This was a prospective observational cohort study carried out at Sir Sayajirao General Hospital from February 2022 to November 2022 and achieved Sample Size-57 patients. All patients diagnosed of acute pancreatitis according to the RAC (at least two criteria: typical clinical presentation including acute persistent abdominal pain, serum amylase exceeding 3 times the upper limit of normal (100 IU/L) and characteristic findings on abdominal ultrasonography and/or computed tomography) were included and patients with Immuno-suppression, pregnancy, Trauma, chronic pancreatitis, active malignancy were excluded from the study. AP has been diagnosed with typical physical examination findings associated with a plasma amylase level greater that 500 IU/L, and radiological verification of the disease by ultrasonography and/or abdominal tomography.

AP severity has been defined according to the Revised Atlanta classification (RAC) in severe, based on the presence of single or multiple persistent organ failure (> 48 h) and/or local complications. Organ failure has been classified according to Modified Marshal score including cardiovascular, respiratory and renal failures. CECT Abdomen has been performed in 48-72 hrs of Admission. Modified Glasgow (Imrie's) Severity Criteria has been calculated (Severity is indicated if >3 criteria are detected within 48 hours of onset of attack). Balthazar score has been calculated based on CECT abdomen changes. The levels of CRP determined at 48 hours has been used in this study and those higher than 150 mg/dl has been considered as being indicative of severe inflammation.

Following outcome parameters in the study has been evaluated:

- Severity of acute pancreatitis.
- Length of hospital stay.
- Length of ICU stay.
- Mortality.

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3. Statistical Analysis

Receiver-operating characteristic (ROC) curves for severe AP has been calculated for Glasgow, Balthazar, CRP48 using cut off values, and the predictive accuracy of each scoring system has been measured by the area under the receiver-operating curve (AUC) with standard error and 95% confidence intervals (CIs).

4. Results

A total of 57 patients of acute pancreatitis satisfying the inclusion and exclusion criteria were enrolled in this study. These patients were subjected to risk assessment by evaluating their GLASGOW (imrie) score, CRP and BALTHAZAR score at the time of hospital admission.

Etiology
Alcoholism was attributed to the cause behind AP in most of the male patients. On the other hand, gallstone was the commonest etiology observed in female gender.

Table 1: Etiology

Etiology	No of males(%)	No of females(%)	Total patient(%)
Alcohol induced	43(91.49%)	0(0%)	43(75.43%)
Gallstone	4(8.51%)	5(50%)	9(15.78%)
Idiopathic	0(0%)	5(50%)	5(8.77%)
	47	10	57

Local Complications
Among the study population, Acute Peripancreatic fluid collection was the most common local complication.

Table 2: local complication

Complications	Number	Percentage
Acute Peripancreatic fluid collection	29	50.80
Pancreatic necrosis	13	22.80
Walled Off necrosis	5	8.77
Pseudocyst of pancreas	10	17.54

Systemic Complications
Organ failure occurred in 10 patients. Renal failure was the commonest.

Table 3: Systemic complication

| Organ failure	No of cases	Percentage
Renal Failure	09	15.79
Respiratory	01	1.75
Cardiovascular	00	00

Comparison between Glasgow, CRP & Balthazar score in predicting severity of acute pancreatitis

GLASGOW score is least sensitive (70%) in predicting severity of acute pancreatitis and almost all 3 scores have equal specificity in predicting severity of acute pancreatitis. There is no statistically significant difference in sensitivity & specificity of GLASGOW score, CRP and BALTHAZAR score in predicting severity of acute pancreatitis (p=0.2019 & p=0.9862).

Variable 1	GLASGOW_score GLASGOW score
Variable 2	CRP
Variable 3	BALTHAZAR_score BALTHAZAR score
Classification variable	Severity_according_to_RAC Severity according to RAC

Sample size			57
Positive group :	Severity according to RAC = 1		10
Negative group :	Severity according to RAC = 0		47

	AUC	SE [a]	95% CI [b]
GLASGOW_score	0.949	0.0265	0.897 to 1.000
CRP	0.967	0.0227	0.923 to 1.000
BALTHAZAR_score	0.690	0.0819	0.530 to 0.851

GLASGOW_score ~ CRP	
Difference between areas	0.0181
Standard Error [c]	0.0341
95% Confidence Interval	-0.0488 to 0.0850
z statistic	0.530
Significance level	P = 0.5964
GLASGOW_score ~ BALTHAZAR_score	
Difference between areas	0.259
Standard Error [c]	0.0885
95% Confidence Interval	0.0851 to 0.432
z statistic	2.922
Significance level	P = 0.0035
CRP ~ BALTHAZAR_score	
Difference between areas	0.277
Standard Error [c]	0.0856
95% Confidence Interval	0.109 to 0.444
z statistic	3.231
Significance level	P = 0.0012
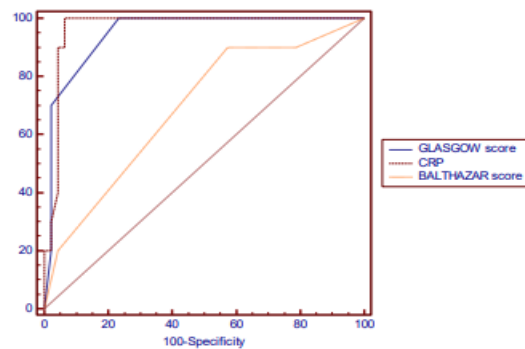
Severity of pancreatitis

	GLASGOW	CRP	BALTHAZAR	P value
Sensitivity	70%	90%	90%	0.2019
Specificity	97.87%	95.74%	95.74%	0.9862

Comparison between GLASGOW, CRP & BALTHAZAR score in predicting mortality of acute pancreatitis

Based on ROC curve comparisons, there is no statistically significant difference between GLASGOW score and CRP and BALTHAZAR score in predicting mortality of acute pancreatitis. Among all 3 scores, BALTHAZAR score is most sensitive and specific (100% & 96.3%) in predicting mortality of acute pancreatitis.
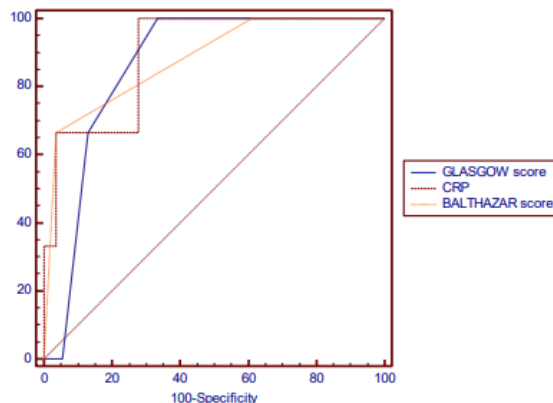
Variable 1	GLASGOW_score GLASGOW score
Variable 2	CRP
Variable 3	BALTHAZAR_score BALTHAZAR score
Classification variable	OUTCOME

Sample size		57
Positive group :	OUTCOME = 1	3
Negative group :	OUTCOME = 0	54

	AUC	SE ᵃ	95% CI ᵇ
GLASGOW_score	0.861	0.0596	0.744 to 0.978
CRP	0.895	0.0905	0.718 to 1.000
BALTHAZAR_score	0.880	0.103	0.677 to 1.000

Pairwise comparison of ROC curves

GLASGOW_score ~ CRP	
Difference between areas	0.0340
Standard Errorᶜ	0.0538
95% Confidence Interval	-0.0715 to 0.139
z statistic	0.631
Significance level	P = 0.5281
GLASGOW_score ~ BALTHAZAR_score	
Difference between areas	0.0185
Standard Errorᶜ	0.136
95% Confidence Interval	-0.249 to 0.286
z statistic	0.136
Significance level	P = 0.8921

CRP ~ BALTHAZAR_score	
Difference between areas	0.0154
Standard Errorᶜ	0.160
95% Confidence Interval	-0.298 to 0.329
z statistic	0.0964
Significance level	P = 0.9232

5. Discussion

In the present study, patients were assessed for GLASGOW, CRP and BALTHAZAR scores. Severity of acute pancreatitis and mortality from acute pancreatitis were recorded and Association of GLASGOW score, CRP and BALTHAZAR score with these parameters was evaluated as well as GLASGOW score, CRP and BALTHAZAR score were compared in terms of sensitivity and specificity in predicting severity and mortality of acute pancreatitis.

❖ **Requirement of ICU Stay in the study**

ICU stay requirement			
	GLASGOW	CRP	BALTHAZAR
Sensitivity	20%	40%	100%
Specificity	86.74%	84.62%	40.38%

GLASGOW score least sensitive while BALTHAZAR score most sensitive in predicting requirement of ICU stay AND GLASGOW score & CRP are almost equally specific in predicting requirement of ICU stay.

❖ **Length of Hospital Stay in the study**

	P value	
SCORES	Present study(n=57)	Marco Simoes(n=126)
GLASGOW	0.0001	0.003
CRP	0.0001	<0.001
BALTHAZAR	0.2807	<0.001

GLASGOW score is efficacious in predicting duration of hospital stay with mean duration of hospital stay is 7.5 days in <=3 group and 13.1 days in >3 group difference of which is statistically significant (p =0.0001) in this study.

GLASGOW score & CRP score is efficacious in predicting duration of hospital stay but BALTHAZAR score is not efficacious in predicting duration of hospital stay.

6. Conclusion

In conclusion we found that GLASGOW score, CRP & BALTHAZAR score have comparable sensitivity and specificity in predicting severity and mortality of acute pancreatitis.

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